

## Trend Study 10R-14-00

Study site name: Lower McCook Ridge Total Exclosure.

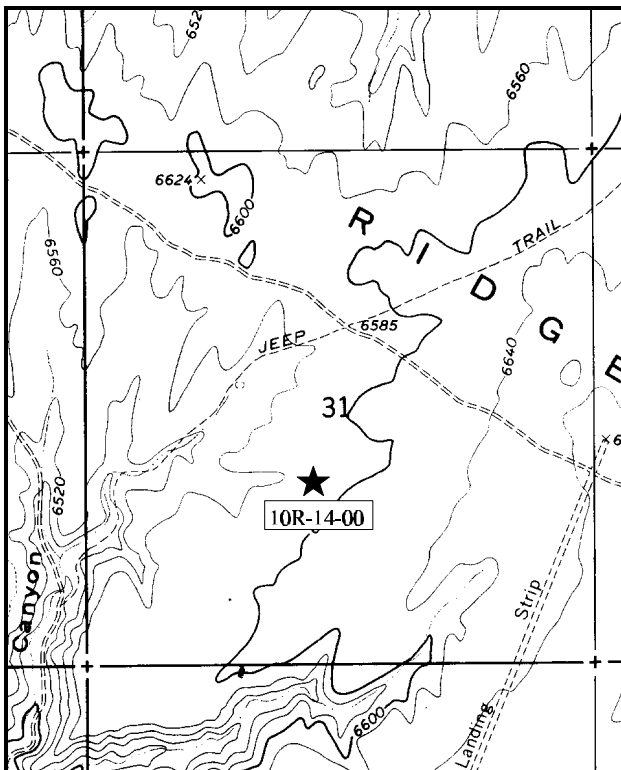
Range type: Desert Shrub.

Compass bearing: frequency baseline 83°M.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 71ft), line 2 (34 & 95ft), line 3 (59ft).

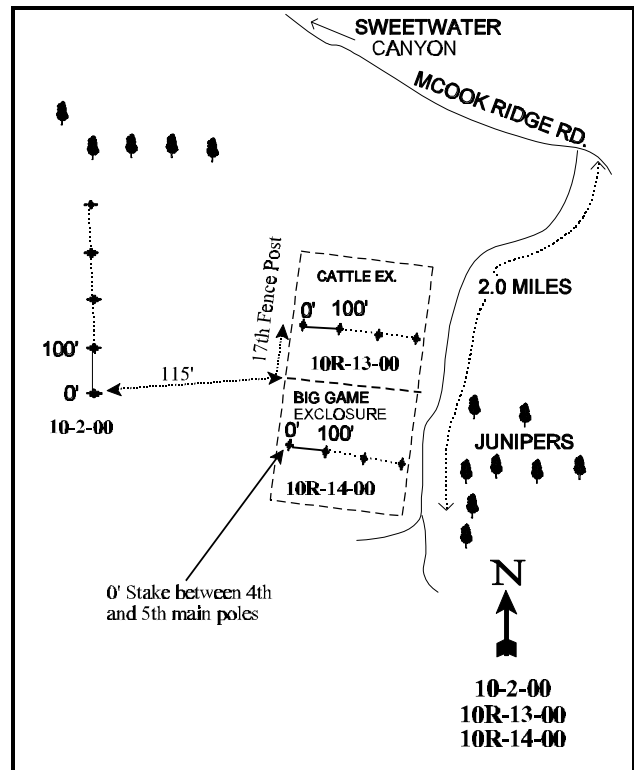
### LOCATION DESCRIPTION

From Indian Ridge road, turn southeast and proceed up McCook Ridge approximately 2 miles. A large exclosure can be seen off the south side of the road. Go inside the total exclosure. The 0-foot stake is on the west side between the 4<sup>th</sup> and 5<sup>th</sup> main poles of the fence. The 0-foot stake is marked with browse tag number 78. The frequency baseline is marked by green fenceposts, 12-18 inches tall.



Map Name: Cooper Canyon.

Township 13S, Range 24E, Section 31



Diagrammatic Sketch

UTM. 4389198 N, 647916 E

## DISCUSSION

### Trend Study No. 10R-14

The Lower McCook Ridge Total Exclosure study is located within the Lower McCook Ridge exclosure complex. The exclosure was constructed in 1964 and is approximately 300 feet by 125 feet. The trend study was established in 1997. It samples inside of the total exclosure which excludes grazing. The site has a slight southwest aspect with a 2-3% slope and an elevation of 6,600 feet.

Percent bare ground is relatively low on this site, estimated at 7% in 1997, and 10% in 2000. Past erosion is apparent with pedestaling around shrubs, yet there are no signs of recent erosion events. Most of the protective ground cover comes from vegetation and litter, with much of this coming from cheatgrass. Vegetation provided nearly 52% cover in 1997, this decreased somewhat in 2000 to about 39%. The decrease is due to the drastic decrease in cheatgrass cover in 2000 due to drought. Litter provided 61% cover in 1997, increasing to 76% in 2000. There is a soil gradient with deeper soils down slope (west) and more shallow soils up slope (east). Average effective rooting depth (see methods) down slope was 32 inches, while up slope average rooting depth was 15 inches. Coinciding with the average rooting depth is the amount of rock found within the soil profile. A stony profile was encountered at an average of 27 inches down slope and 11 inches up slope. It was observed that less cheatgrass and more young basin big sagebrush plants were associated with the more shallow soils, while the opposite was observed with the deeper soils. Average soil temperature over the whole site is 60°F at 20 inches in depth.

Winterfat has the highest browse density in the total exclosure with an estimated 8,020 plants/acre in 1997, and 9,060 plants/acre in 2000. These plants are relatively larger (17 inches x 19 inches) than the plants in the adjacent livestock exclosure (8 inches x 8 inches) and outside the exclosure (8 inches x 9 inches) sites. This population has a mostly mature age structure with low biotic potential (number of seedlings) and recruitment from young plants. Decadency was low in 1997 at 8%, but increased to 37% in 2000. With no use inside the total exclosure, this increase in decadency could be due to drought and/or old age in a mostly mature population. Vigor for these plants is good with only 2% of the population classified as dying in both 1997 and 2000.

Fourwing saltbush has an estimated density of 1,280 plant/acre in 1997 and 1,160 plants/acre in 2000. Percent decadency has been moderately high in 1997 and 2000 at 41% and 40% respectively. Poor vigor decreased from 14% in 1997 to 5% in 2000. Recruitment was very low at 2% in 1997, with no young plants sampled in 2000. These plants are quite large averaging 38 inches in height with a crown of 52 inches in 2000. Currently, the dead to live ratio is 1:15. Fringed sagebrush was also encountered and has an estimated density of 4,620 plants/acre in 2000. The population has a mostly mature age structure with good vigor and a high biotic potential of 2,060 seedlings/acre in 2000.

Sagebrush on the site has characteristics of basin big sagebrush (*Artemisia tridentata tridentata*) and Wyoming big sagebrush (*Artemisia tridentata wyomingensis*). Identification was difficult due to the level of hybridization resulting in all sagebrush being classified as basin big sagebrush. Basin big sagebrush had an estimated density of 1,200 plants/acre in 2000. Inside the total exclosure, basin big sagebrush is found mainly along the fence line on the more shallow soils along the east fence where cheatgrass is less dense. Other basin big sagebrush plants were observed along the fence on deep and shallow soils with the deeper soils having a lower abundance of seedlings compared to the more shallow soils. In 1997, the seedlings (2,480 plants/acre) were encountered only under three mature shrubs. Seedlings were estimated at only 80 per acre in 2000, with recruitment from young plants being high at 81% in 1997 and 68% in 2000. The sagebrush population has good vigor and shows light use in both 1997 and 2000.

In 1997, cheatgrass provided nearly 29% average cover, had a nested frequency of 473 out of a possible 500, and was found in 99% of the quadrats. Due to drought in 2000, cheatgrass was much less abundant and decreased to only 2% cover, had a nested frequency of 178, and was sampled in only 61% of the quadrats. Perennial herbaceous species are found sporadically on this site with only three perennial grasses and four perennial forbs sampled in 1997 and 2000. Perennial grasses include: thickspike wheatgrass, Sandberg bluegrass, and bottlebrush squirreltail. These species combine for just over 1% cover and a quadrat frequency of 15% in 2000. Perennial forbs increased in nested and quadrat frequencies in 2000 with prickly lettuce and yellow salsify being the most abundant. Grasses and forbs combined provide only 13% of the total vegetative cover at this site.

#### 1997 APPARENT TREND ASSESSMENT

Soils are alluvially deposited, loamy in texture, with some rock and pavement on the surface (~2%). There are signs of past soil movement, but movement is not severe at this time. Vegetation and litter cover values are high enough to protect the soil from both wind and water erosion. This site exhibits the effects of a soil depth gradient. It was observed that areas with more shallow soil on the site did not support as dense a stand of cheatgrass as do the areas with deeper soils. It was also observed that basin big sagebrush was basically restricted to the edge of the exclosure with none found in the middle. The middle of the exclosure was dominated by fringed sagebrush, winterfat, and a few scattered fourwing saltbush plants. Winterfat accounts for 54% of the browse cover and has the highest estimated browse density with 8,020 plants/acre. The herbaceous understory is of extremely poor composition with cheatgrass dominating both nested and quadrat frequencies. With such a dense stand of cheatgrass, shrub recruitment will be suppressed and will be detrimental to the reproductive success of the shrub populations.

#### 2000 TREND ASSESSMENT

Trend for soil is stable. Bare ground only slightly increased with drought, while vegetation and litter cover combined remain very high and adequate to prevent serious erosion. Trend for browse is stable overall. The main negative factor is the increased decadency in winterfat from 8% to 37%. Vigor remains generally good and very few of the decadent plants are classified as dying. With normal precipitation, decadency will most likely decrease. Fourwing saltbush shows a stable, but overly mature population with decadency staying nearly the same at 41%. No seedling or young plants were sampled in 2000. A hybrid of basin big sagebrush and Wyoming big sagebrush shows increased density and high recruitment. Vigor is good and no decadent plants were sampled in either 1997 or 2000. Trend for the herbaceous understory is slightly up with perennial species increasing in sum of nested frequency. Cheatgrass was also greatly reduced due to drought.

#### TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --  
Herd unit 10R, Study no: 14

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'97	'00	'97	'00	'97	'00
G	Agropyron dasystachyum	5	*23	1	7	.15	.84
G	Bromus tectorum (a)	473	*178	99	61	28.89	2.16
G	Poa secunda	9	11	3	5	.36	.12
G	Sitanion hystrix	1	6	1	3	.03	.18
Total for Annual Grasses		473	178	99	61	28.89	2.16
Total for Perennial Grasses		15	40	5	15	0.54	1.14
Total for Grasses		488	218	104	76	29.44	3.30
F	Descurainia pinnata (a)	16	25	8	10	.23	.13
F	Draba spp. (a)	-	2	-	1	-	.00
F	Lappula occidentalis (a)	3	5	2	3	.01	.01
F	Lactuca serriola	-	*61	-	24	-	.88
F	Sisymbrium altissimum (a)	-	1	-	1	-	.00
F	Sphaeralcea coccinea	25	31	8	14	.31	.36
F	Taraxacum officinale	-	-	-	-	.00	-
F	Tragopogon dubius	9	*45	5	19	.07	.61
Total for Annual Forbs		19	33	10	15	0.24	0.15
Total for Perennial Forbs		34	137	13	57	0.38	1.85
Total for Forbs		53	170	23	72	0.63	2.01

\* Indicates significant difference at % = 0.10

BROWSE TRENDS --  
Herd unit 10R, Study no: 14

T y p e	Species	Strip Frequency		Average Cover %	
		'97	'00	'97	'00
B	Artemisia frigida	41	58	2.42	5.33
B	Artemisia tridentata tridentata	7	6	1.33	2.62
B	Atriplex canescens	45	44	7.39	12.48
B	Ceratoides lanata	94	93	13.34	13.75
Total for Browse		187	201	24.50	34.18

BASIC COVER --

Herd unit 10R, Study no: 14

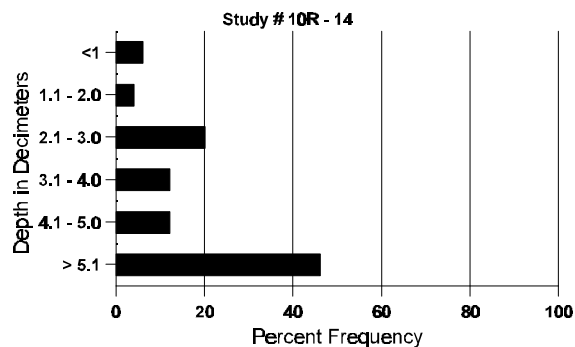
Cover Type	Nested Frequency		Average Cover %	
	'97	'00	'97	'00
Vegetation	484	331	51.66	38.90
Rock	39	6	.13	.01
Pavement	118	121	1.81	.74
Litter	497	492	61.01	76.09
Cryptogams	150	35	3.45	.23
Bare Ground	145	207	7.03	10.85

SOIL ANALYSIS DATA --

Herd Unit 10R, Study no: 14

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
25.9	59.6 (20.0)	6.7	31.0	37.8	31.2	4.98	7.15	153.6	0.65

## Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 10R, Study no: 14

Type	Quadrat Frequency	
	'97	'00
Rabbit	2	6

## BROWSE CHARACTERISTICS --

Herd unit 10R, Study no: 14

Artemisia frigida																		
A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
S	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	103	-	-	-	-	-	-	-	-	-	-	-	-	2060			103
Y	97	8	-	-	3	-	-	-	-	-	11	-	-	-	220			11
	00	31	-	-	-	-	-	-	-	-	31	-	-	-	620			31
M	97	104	-	-	-	-	-	-	-	-	104	-	-	-	2080	15	16	104
	00	183	-	-	-	-	-	2	-	-	185	-	-	-	3700	6	13	185
D	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	00	15	-	-	-	-	-	-	-	-	15	-	-	-	300			15
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			+50%							
'00		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'97	2320	Dec:	1%	
														'00	4620		6%	
Artemisia tridentata tridentata																		
S	97	46	-	-	78	-	-	-	-	-	124	-	-	-	2480			124
	00	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
Y	97	16	-	-	10	-	-	-	-	-	26	-	-	-	520			26
	00	41	-	-	-	-	-	-	-	-	41	-	-	-	820			41
M	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120	33	37	6
	00	19	-	-	-	-	-	-	-	-	19	-	-	-	380	30	31	19
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			+47%							
'00		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'97	640	Dec:	-	
														'00	1200		-	
Atriplex canescens																		
Y	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	97	37	-	-	-	-	-	-	-	-	37	-	-	-	740	35	42	37
	00	27	-	-	8	-	-	-	-	-	35	-	-	-	700	38	52	35
D	97	26	-	-	-	-	-	-	-	-	17	-	-	9	520			26
	00	12	-	-	9	1	-	1	-	-	20	-	-	3	460			23
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			14%			- 9%							
'00		02%			00%			05%										
Total Plants/Acre (excluding Dead & Seedlings)														'97	1280	Dec:	41%	
														'00	1160		40%	

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Atriplex confertifolia																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	33	33	0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'00		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'97	0	Dec:	-	
														'00	0		-	
Ceratoides lanata																		
S	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	97	42	-	-	6	-	-	-	-	-	48	-	-	-	960			48
	00	12	-	-	-	-	-	-	-	-	12	-	-	-	240			12
M	97	299	-	-	22	-	-	-	-	-	321	-	-	-	6420	23	18	321
	00	253	-	-	20	-	-	-	-	1	274	-	-	-	5480	17	19	274
D	97	25	-	-	7	-	-	-	-	-	22	-	-	10	640			32
	00	129	-	-	38	-	-	-	-	-	157	-	-	10	3340			167
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			02%			+11%							
'00		00%			.22%			02%										
Total Plants/Acre (excluding Dead & Seedlings)														'97	8020	Dec:	8%	
														'00	9060		37%	
Juniperus osteosperma																		
S	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'00		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'97	0	Dec:	-	
														'00	0		-	

## LOWER MCCOOK RIDGE EXCLOSURE COMPARISON SUMMARY

Trend Study No. 10-2 (outside), 10R-13 (livestock), and 10R-14 (total)

### 2000 Trend Data Comparisons

	<u>Outside Exclosure</u>	<u>Livestock Exclosure</u>	<u>Total Exclosure</u>
<b>Big sagebrush</b>			
Average Cover	12.0	21.7	2.6
Density (plants/acre)	3,980	6,900	1,200
% young	32 (1,274/acre)	14 (966/acre)	68 (816/acre)
% decadent	26 (331/acre)	31 (299/acre)	0
% decadent/ dying	35 (116/acre)	10 (30/acre)	0
% poor vigor	9	3	0
% heavy use	13	30	0
<b>Winterfat</b>			
Average Cover	2.2	2.5	13.8
Density (plants/acre)	7,020	5,920	9,060
% young	3 (211/acre)	2 (118/acre)	3 (271/acre)
% decadent	10 (702/acre)	14 (829/acre)	37 (3,352/acre)
% decadent/ dying	6 (42/acre)	22 (182/acre)	6 (201/acre)
% poor vigor	0.6	3	2
% heavy use	21	3	0
<b>Fourwing saltbush</b>			
Average Cover	2.6	5.6	12.5
Density (plants/acre)	700	1,100	1,160
% young	0	0	0
% decadent	40 (280/acre)	67 (737/acre)	40 (464/acre)
% decadent/ dying	0	19 (140/acre)	13 (60/acre)
% poor vigor	0	13	5
% heavy use	3	13	0

The Lower McCook Ridge area is important big game winter range. Several important key browse species are present in the area including: big sagebrush, winterfat, and fourwing saltbush. The table above compares some of the key browse parameters for these three species. Differences in densities for these species, especially



sagebrush, may be the result of several factors including: grazing regimes, interspecific and intraspecific competition, small sampled area, timing of precipitation, and a non-homogeneous landscape.

Big sagebrush was classified as basin big sagebrush, but is most likely a hybrid between basin big sagebrush and Wyoming big sagebrush. Density varies between the exclosures with the total exclosure having the least amount of sagebrush plants, the livestock exclosure having the most, and outside the exclosure being intermediate. Recruitment from the young age class is currently high in all treatments with 14% young in the livestock exclosure, 32% outside the exclosure, and 68% in the total exclosure. The rate of decadency is highest in the livestock exclosure, slightly lower outside the exclosure, with no decadency found in the total exclosure. Average cover is highest in the livestock exclosure, intermediate outside the exclosure, and lowest in the total exclosure. There are several possible explanations for the differences in population parameters for sagebrush between exclosures. The highest level of recruitment occurs in the total exclosure where the sagebrush density is lowest, but with no use, each plant has more seed from year to year which increases the probability of young plants becoming established from seed. Also, with a lower density of sagebrush, there is less intraspecific competition with young plants to become established. The lowest recruitment is found in the livestock exclosure which also has the highest sagebrush density and average cover. Competition is greatest here with high density and cover and it appears that this could be negatively affecting the establishment of younger plants. Extended drought adds to the problem with less resources being available and more stress being placed on individual plants.

Conversely, winterfat has the highest density inside the total exclosure, is intermediate outside the exclosure, and is lowest inside the livestock exclosure. Recruitment from young plants is very low on all three transects. Decadency is lowest outside the exclosure, intermediate in the livestock exclosure, and highest inside the total exclosure. Heavy use is highest outside the exclosure at 21%, decreasing to 3% in the livestock exclosure, with no heavy use in the total exclosure. These levels of heavy use are not extreme, and with no use on winterfat inside the total exclosure, and very little heavy use in the livestock exclosure, it appears that factors other than utilization are likely responsible, at least in part, for higher rates of decadency on winterfat. It is interesting to note that winterfat cover is about 6 times greater in the total exclosure than in both the livestock exclosure and outside the exclosure. Average height and crown measurements in 2000 show winterfat inside the total exclosure to be twice that of winterfat in either of the other two transects. With the highest density, highest cover, and largest individuals occurring inside the total exclosure, it is likely that competition is greater here and may be responsible for the highest rate of decadency inside the total exclosure. Precipitation, or the lack of in recent years, most likely plays a role as well, especially summer precipitation for a warm season species.

Fourwing saltbush has similar densities in the total and livestock exclosures, with a lower density outside the exclosure. Percent decadency is highest inside the livestock exclosure, and the same in the total exclosure and outside. Heavy use is low outside the exclosure (3%) and inside the livestock exclosure (13%). As with winterfat, the high decadency rate of fourwing saltbush is likely due more to drought and/or competition as much as anything.